UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/649,528	08/28/2000	Chowdary Ramesh Koripella	CT00-013	8469

23330 7590 11/07/2005

MOTOROLA, INC.
LAW DEPARTMENT
1303 E. ALGONQUIN ROAD
SCHAUMBURG, IL 60196

EXAMINER	
LEUNG, JENNIFER A	
ART UNIT	**PAPER NUMBER**
1764	

DATE MAILED: 11/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/649,528	KORIPELLA ET AL.	
	Examiner	Art Unit	
	Jennifer A. Leung	1764	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 August 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,8,10,11,16 and 18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,8,10,11,16 and 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment submitted on August 10, 2005 has been received and carefully considered. Claims 2-7, 9, 12-15, 17 and 19-21 are cancelled. Claims 1, 8, 10, 11, 16 and 18 remain active.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 8, 10, 11, 16 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Furuya et al. (JP 06-111838).

Regarding claims 1, 8 and 10, Furuya et al. (see Figures, Abstract, and Machine Translation) discloses a hydrogen generator comprising:

a reaction zone including a reforming catalyst (i.e., plate **1**, containing reforming catalyst **6**; FIG. 1, 2; sections [0010]-[0014]) and a vaporization zone receiving liquid fuel and comprising at least one vapor channel for transporting a vapor from the vaporization zone to the reaction zone (i.e., plate **1** inherently comprises a vaporization zone and vapor channels as defined by flow paths **3**, as evidenced by the disclosed evaporation of the "poured" methanol and water within the fuel processor; see Example 1; sections [0060], [0062]); wherein the vaporization and reaction zones comprise a plurality of parallel channels (i.e., passages **3** in plates **1**; FIG. 1, 2);

an inlet channel for introducing liquid fuel into the vaporization zone (as shown in FIG. 7, via a fluid supply hole **27** to a plate **22** containing reforming catalyst in flow paths **23**, wherein plate **22** and plate **1** are the same element having different reference numerals; see sections [0034]-[0037]; Also, as schematically shown in FIG. 18, labeled as "MeOH+H_2O", supplied to hole "d"); and

an outlet channel for transporting hydrogen enriched gas out of the reaction zone (In FIG. 7, a corresponding discharge hole, not drawn, located in plate **22** downstream of hole **27** and flow paths **23**, wherein plate **22** and plate **1** are the same element having different reference numerals; see sections [0034]-[0037]; Also, as schematically shown in FIG. 18, labeled as "H_2+CO_2+CO+H_2O+MeOH", discharged via hole "h").

The apparatus further comprises a chemical heater including a catalyst (i.e., plates **2** including a combustion catalyst **5** coated on passages **4**; sections [0010]-[0016]; FIG. 1, 2) thermally coupled to the reaction and vaporization zones (i.e., reforming plates **1**; FIG. 1, 2) using thermally conductive channels or vias (i.e., walls defining combustion passages **4**). As schematically shown in FIG. 18, the chemical heater, now labeled as flat plate **121**, may further comprise an air inlet for receiving oxygen for the oxidation of the fuel (i.e., labeled as the Japanese character for air, supplied to hole "e"; see sections [0085]-[0086]) and an inlet channel for providing fuel to the chemical heater (i.e., labeled as "H_2/MeOH", supplied to hole "f"). The inlet channel, the vaporization zone, the reaction zone, the at least one vapor channel, the outlet channel and the chemical heater all comprise a fuel processor and all are formed within an integral, sintered, monolithic ceramic carrier (best seen in FIG. 7; plates **1**, **2** comprise materials having high thermal conductivity, including sintered ceramic; FIG. 1, 2; sections [0017], [0030]-[0033]).

Although FIG. 18 schematically shows the inlet channel for providing fuel to the chemical heater (i.e., via hole "f") being separate from the inlet channel for providing fuel to the vaporization zone (i.e., via hole "d"), FIG. 15 further illustrates that the fuel supply paths are actually connected, wherein the inlet channel for supplying fuel to the vaporization zone comprises an opening to further provide fuel to the chemical heater (i.e., fuel from a single tank **41** supplies fuel to both the vaporization zone/reaction zone and the chemical heater, within reforming machine **42**, via passages **43** and **44**, respectively; see sections [0072]-[0077]; see also FIG. 9).

Regarding claims 11 and 16, Furuya et al. (see Figures, Abstract, and JPO Machine Translation) disclose an apparatus comprising:

a three-dimensional integral, sintered, monolithic multi-layer ceramic carrier structure (i.e., plates **1**, **2** comprising materials having high thermal conductivity, including sintered ceramic; FIG. 1, 2; sections [0017], [0030]-[0033]), the carrier structure further defining a fuel processor (i.e., a reforming machine **42**, comprising plates **1** and **2**; FIG. 8, 15; sections [0040]-[0043]; [0074]-[0077]) having a reaction zone including a reforming catalyst (i.e., reforming catalyst **6** of plate **1**; FIG. 1, 2; sections [0010]-[0014]) and inherently comprising a vaporization zone, as evidenced by the disclosed evaporation of the "poured" methanol and water within the fuel processor (i.e., Example 1; sections [0060], [0062]);

the vaporization and the reaction zones comprising a plurality of parallel channels formed in the ceramic carrier for transporting a liquid fuel to the vaporization zone and a vapor in the reaction zone (i.e., passages **3** in plates **1**; FIG. 1, 2; Example 1);

the ceramic carrier further comprising an integrated heater (i.e., combustion plates **2**) thermally

coupled to the reaction and vaporization zones using thermally conductive channels or thermally conductive vias (i.e., thermally conductive passages **4**; FIG. 1, 2; sections [0010]-[0016]); and

an outlet channel for transporting hydrogen enriched gas out of the fuel processor (In FIG. 7, a corresponding discharge hole, not drawn, located in plate **22** downstream of hole **27** and flow paths **23**, wherein plate **22** and plate **1** are the same element having different reference numerals; see sections [0034]-[0037]).

The integrated heater is in the form of a chemical heater including a catalyst and arranged to oxidize fuel (i.e., plates **2** including a combustion catalyst **5** coated on passages **4**; sections [0010]-[0016]). As schematically shown in FIG. 18, the apparatus further comprises an inlet channel (i.e., labeled as "H_2/MeOH", supplied to hole "f"), wherein the chemical heater (i.e., now labeled as flat plate **121**, containing the combustion catalyst; see sections [0085]-[0086]) receives fuel from the inlet channel and includes an air port for receiving oxygen for the oxidation of the fuel (i.e., labeled as the Japanese character for air, supplied to hole "e"). The vaporization zone, the reaction zone, the plurality of parallel channels, the chemical heater, the inlet channel and the outlet channel are each formed within the integral, sintered, monolithic ceramic carrier (best seen in FIG. 7).

Regarding claim 18, Furuya et al. (see Figures, Abstract, and JPO Machine Translation) disclose an apparatus comprising:

a three-dimensional integral, sintered, monolithic multi-layer ceramic carrier structure (i.e., plates **1, 2** comprising materials having high thermal conductivity, including sintered ceramic; FIG. 1, 2; sections [0017], [0030]-[0033]), the carrier structure further defining

a fuel processor (i.e., a reforming machine **42**, comprising plates **1** and **2**; FIG. 8, 15; sections [0040]-[0043]; [0074]-[0077]) having a reaction zone including a reforming catalyst (i.e., reforming catalyst **6** of plate **1**; FIG. 1, 2; sections [0010]-[0014]) and inherently comprising a vaporization zone, as evidenced by the disclosed evaporation of "poured" methanol within the fuel processor (i.e., Example 1; sections [0060]);

the vaporization and the reaction zones comprising a plurality of parallel channels formed in the ceramic carrier for transporting a liquid fuel to the vaporization zone and a vapor in the reaction zone (i.e., passages **3** in plates **1**; FIG. 1, 2; Example 1);

the ceramic carrier further comprising an integrated heater (i.e., combustion plates **2**; FIG. 1, 2) thermally coupled to the reaction and vaporization zones (i.e., reforming plates **1**; FIG. 1, 2) using thermally conductive structures (i.e., walls defining combustion passages **4**); and

an outlet channel for transporting hydrogen out of the fuel processor (In FIG. 7, a corresponding discharge hole, not drawn, located in plate **22** downstream of hole **27** and flow paths **23**, wherein plate **22** and plate **1** are the same element having different reference numerals; see sections [0034]-[0037]).

The integrated heater is a chemical heater including a catalyst arranged to oxidize fuel (i.e., plates **2** include combustion catalyst **5** coated on passages **4**; sections [0010]-[0016]). As schematically shown in FIG. 18, the chemical heater (i.e., now labeled as flat plate **121**, see sections [0085]-[0086]) further comprises an air port for providing oxygen for the oxidation of the fuel (i.e., labeled as the Japanese character for air, supplied to hole "e") and an inlet channel having an opening to provide fuel to the chemical heater (i.e., labeled as "H_2/MeOH", supplied to hole "f"). The vaporization zone, the reaction zone, the plurality of parallel channels, the

chemical heater, the inlet channel and the outlet channel are each formed within the integral, sintered, monolithic ceramic carrier (best seen in FIG. 7).

Instant claims 1, 8, 10, 11, 16 and 18 structurally read on the apparatus of Furuya et al.

Response to Arguments

3. Applicant's arguments filed on August 10, 2005 have been fully considered but they are not persuasive. Beginning on page 7, first paragraph, Applicant argues,

> "The Applicant asserts that Furuya discloses a reactor built using discrete pieces of materials to form the plates, with catalyst deposited on them prior to sealing into a packaged assembly. Furuya utilizes discrete pieces to assemble the unit, which according to section [0010], includes the "laminating of two or more plates". The Applicant asserts that throughout the disclosure of Furuya it is stated that these discrete pieces are simply "laminated". The Applicant asserts that paragraph [0030]-[0033] as referred to by the Examiner, describes the sintering of a catalyst support layer within the formed channel, to the plate itself. The disclosure fails to disclose the sintering of the plurality of components that make up the final assembly."

Additionally, on page 8, first paragraph, Applicant states,

> "In contrast, the Applicant discloses forming the structures in the green state using multilayer ceramic technology so that subsequent to sintering, a monolithic structure is formed. The Applicant asserts that this type of monolithic structure eliminates any leakage of gas, or liquid that flows through the structure. In addition, this method of forming the device out of green sheets with subsequent sintering of the multiple layers provides for ease and accuracy in alignment of the channels formed therein, due to ceramic alignment during processing."

The Examiner respectfully disagrees and maintains that the apparatus of Furuya structurally reads on the instant claims. As recited in the claims, the hydrogen generator comprises a "three-

dimensional, integral, sintered, monolithic, multilayer ceramic carrier structure" (e.g., claim 18). As clearly shown in FIG. 7 of Furuya, the structure is "three-dimensional" and "multilayer". As described in section [0017], the material of the layers comprises "ceramic". As described in section [0030-0033], the layer carries a catalyst and therefore functions as a "carrier structure". Additionally, the catalyst is "sintered" onto the structure. The term "integral" is defined as being "a complete unit; a whole" and therefore the apparatus of Furuya is essentially integral, as it defines a complete unit which contains each of the claimed structural elements (e.g., a reaction zone with reforming catalyst, a vaporization zone, etc.). Additionally, as known in the art, each of the layers constitutes a "monolithic" catalyst layer (see FIG. 1, 2). Thus, the apparatus of Furuya structurally reads on the recited feature of a "three-dimensional, integral, sintered, monolithic, multilayer, ceramic carrier structure."

It is noted that the feature upon which applicant relies (i.e., a monolithic structure comprising the inherent characteristics of a structure being formed according to the disclosed "multilayer ceramic technology") is not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Allowable Subject Matter

4. The prior art does not disclose or adequately suggest a fuel processor comprising a three-dimension, integral, sintered, monolithic, ceramic carrier structure being formed according to the "ceramic technology" as disclosed and further argued by Applicants. It is suggested by the Examiner to incorporate such feature into the apparatus as claimed by reciting the ceramic carrier structure according to a "product-by-process" format. The following claims drafted by the

Examiner and considered to distinguish patentably over the art of record in this application are presented to applicant for consideration:

Claim 22. (NEW) A hydrogen generator comprising:

a fuel processor being collectively defined by,

an inlet channel for transporting a liquid fuel;

a vaporization zone receiving liquid fuel from the inlet channel;

at least one vapor channel for transporting vaporized liquid fuel from the vaporization zone to a reaction zone; the reaction zone including a reforming catalyst for reforming the vaporized liquid fuel into a hydrogen enriched gas;

an outlet channel for transporting the hydrogen enriched gas out of the reaction zone; and

a chemical heater further receiving liquid fuel from the inlet channel; the chemical heater being thermally coupled to the reaction zone and the vaporization zone using thermally conductive channels or thermally conductive vias; the chemical heater including a catalyst and an air inlet for receiving oxygen for the oxidation of the liquid fuel to produce heat;

wherein the inlet channel, the vaporization zone, the at least one vapor channel, the reaction zone, the outlet channel and the chemical heater are formed within a plurality of individual ceramic layers that are assembled and subsequently sintered together to form a single, three-dimensional, integral, monolithic, ceramic carrier structure.

Claim 23. (NEW) The hydrogen generator as claimed in claim 22, wherein at least one of the vaporization zone and the reaction zone include a plurality of parallel channels or at least one serpentine channel.

Claim 24. (NEW) A hydrogen generator comprising:

a fuel processor being collectively defined by,

an inlet channel for transporting a liquid fuel;

a vaporization zone receiving liquid fuel from the inlet channel;

at least one vapor channel for transporting vaporized liquid fuel from the vaporization zone to a reaction zone; the reaction zone including a reforming catalyst for reforming the vaporized liquid fuel into a hydrogen enriched gas;

an outlet channel for transporting the hydrogen enriched gas out of the reaction zone; and

a heater thermally coupled to the reaction zone and the vaporization zone using thermally conductive channels or thermally conductive vias; the heater comprising an electrically driven resistive heater or a chemical heater further receiving liquid fuel from the inlet channel; the chemical heater including a catalyst and an air inlet for receiving oxygen for the oxidation of the liquid fuel to produce heat;

wherein at least one of the vaporization zone and the reaction zone comprises a plurality of parallel channels or at least one serpentine channel; and

the inlet channel, the vaporization zone, the at least one vapor channel, the reaction zone,

the outlet channel and the heater are formed within a plurality of individual ceramic layers that are assembled and subsequently sintered together to form a single, three-dimensional, integral, monolithic, ceramic carrier structure.

Claim 25. (NEW) A hydrogen generator comprising:

a fuel processor being collectively defined by,

an inlet channel for transporting a liquid fuel;

a vaporization zone receiving liquid fuel from the inlet channel;

at least one vapor channel for transporting vaporized liquid fuel from the vaporization zone to a reaction zone; the reaction zone including a reforming catalyst for reforming the vaporized liquid fuel into a hydrogen enriched gas;

an outlet channel for transporting the hydrogen enriched gas out of the reaction zone; and

a heater thermally coupled to the reaction zone and the vaporization zone using thermally conductive structures; the heater comprising an electrically driven resistive heater or a chemical heater further receiving liquid fuel from the inlet channel; the chemical heater including a catalyst and an air inlet for receiving oxygen for the oxidation of the liquid fuel to produce heat;

wherein at least one of the vaporization zone and the reaction zone comprises a plurality of parallel channels or at least one serpentine channel; and

the inlet channel, the vaporization zone, the at least one vapor channel, the reaction zone,

the outlet channel and the heater are formed within a plurality of individual ceramic layers that are assembled and subsequently sintered together to form a single, three-dimensional, integral, monolithic, ceramic carrier structure.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer A. Leung
October 30, 2005

Glenn Caldarola
[illegible] Patent Examiner
[illegible] 1700